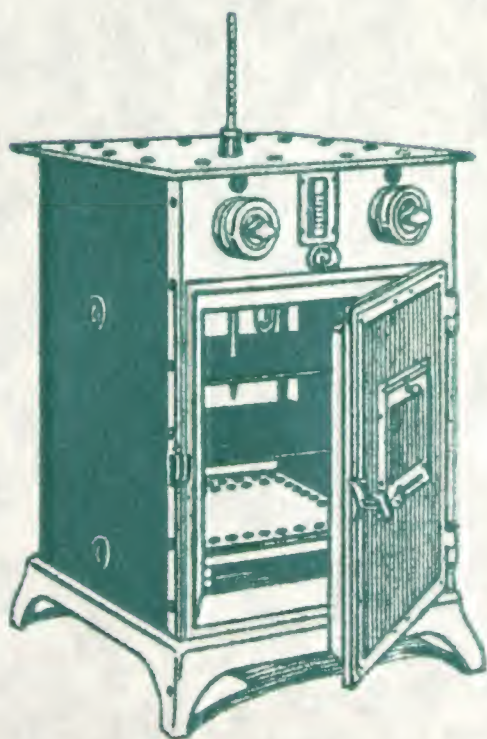


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FREAS

electric ovens



BEER





FREAS

Electric Constant Temperature

Drying Ovens

Vacuum Drying Ovens

Conditioning Ovens

Incubators

Sterilizers

Water Thermostats

Steam-Water Mixers

Steam Hot Plates.

Scientific Apparatus

Scientifically Constructed.

THE THERMO ELECTRIC INSTRUMENT CO.

10 JOHNSON STREET

NEWARK, N. J., - - - U. S. A.

(ALSO MANUFACTURERS OF THE TELCO APPARATUS)

WE WELCOME visitors to our factory in Newark, N. J., where they may see our product in the rough and judge for themselves as to the quality of the materials and workmanship entering into its construction.

The Freas Apparatus is sold by the leading apparatus dealers in America, Canada and many foreign countries.

The Freas Electrical Apparatus can be supplied for any voltage and current.

In ordering always specify the voltage and current, also cycles and phase if alternating current is to be used.

All Freas Apparatus is carefully tested before shipment.

It is packed in a thoroughly substantial manner.

Wherever possible, the apparatus is properly assembled, ready for immediate operation.

Full instructions regarding such set up as is necessary and the operation accompany the shipment.

All prices are net F. O. B., Shipping Point.

FOREWORD.

SCIENTIFIC research, no longer purely an academic exercise, but also an important part of our great industrial organization, demands apparatus that is absolutely dependable, accurate and economical. In industry where costs are all important, the use of labor saving appliances wherever economies can be effected is unquestioned. As the laboratory is an integral part of the enterprise, it is all the more important that time-saving apparatus should be used, because the labor cost is relatively much higher. Also, from the point of view of society in general, economics dictates that even in the private laboratory or solely academic research institution, the energy of highly trained workers must be most effectively directed.

Through years of use in the leading scientific institutions of the world, governmental and private, the Freas Apparatus has been found to satisfactorily fulfill these demands.

After years of experience in the manufacture of the Freas Apparatus, we believe that we have modernized it in every respect to bring it in accord with the everwidening demands of the scientist. However, we invite the correspondence of the scientific experimenter with regard to its adaptation to his specific requirements.

THE THERMO ELECTRIC INSTRUMENT CO.

10 Johnson Street

Newark, N. J.



THE FREAS CONSTANT TEMPERATURE ELECTRIC OVENS

THE Freas Constant Temperature Electric Oven is designed to fulfill the need of a drying oven in which samples may be dried or tests carried out at a fixed temperature, that will not vary over indefinite periods of time. The value of this feature in scientific work cannot be denied, because results are of little value unless uniform conditions have been maintained during the test or can be maintained in future operations.

These ovens permit the attainment of regulated conditions without requiring the attention of the worker, beyond initially adjusting the regulator to provide the desired conditions. This adjustment is simply consummated by means of a milled thumb screw. Thus the worker can start his work in the oven, then divert his attention to some other problem, with the confidence that the apparatus will maintain conditions more uniformly than he could manually. This automatic feature then permits the most efficient use of the highly trained laboratory worker's time.

Economy in the use of electrical energy is another feature. This is gained by an intermittent flow of current, sufficient to supply the heat required for the evaporation of the moisture, transfer to the materials under test and that lost through conduction to the outside atmosphere. That lost through radiation is reduced to a minimum by the heat retaining construction of the oven.

The construction of the Freas Oven is such that it will permit the roughest sort of usage without impairing its efficiency or operating characteristics.

It is safe to operate, in that inflammable vapors from the material being dried cannot be ignited through the electrical control. The Freas Ovens have been approved by the National Board of Fire Underwriters.

The Freas Ovens are designed to operate equally satisfactorily over the entire range for which they are intended.

Freas Constant Temperature Electric Ovens have found use in the determination of moisture in wheat, sugar, coal, textiles, paper, etc.; of the oxidation of rubber, oils, etc.; drying qualities of paints and varnishes. These are just a few of the many uses, for to enumerate all would be beyond the scope of this catalog.

Freas Constant Temperature Drying Ovens are distinguished by the following qualities: constancy, reliability, economy, durability and flexibility.





THE CONSTRUCTION OF THE FREAS CONSTANT TEMPERATURE ELECTRIC DRYING OVEN

THE oven consists of a double walled chamber, both walls being made of asbestos transite. The space between the walls is lined with air cell asbestos paper, thus reducing to a minimum the heat loss through conduction to the outside atmosphere.

The walls are rigidly held together with angle iron bracing at the corners and are mounted on a cast iron base.

A cast aluminum front is provided to support a double walled door.

The door is well hinged, and is provided with a positive door catch to prevent accidental opening.

Also windows are provided in the door to permit observation of the contents of the oven without having to open the door.

Interior illumination of the oven is effected by the use of a small lamp which is externally controlled.

Openings through the side walls at the top and bottom permit ventilation.

Heat is furnished through a heating plate of asbestos transite, wound with high resistance alloy wire. The heating plate located at the bottom of the chamber may be easily removed.

Regulation is accomplished by means of the patented Freas Thermo Regulator, which causes the heating circuit to be closed or opened. This is accomplished through the expansion of a vertical control rod at the rear of the chamber, which through a series of levers, causes the contacts at the top of the oven to "make and break." This "make and break" is accomplished without arcing.

The lower contact serves as an indicator which can be adjusted by means of the thumb screw according to the temperature desired as denoted on a scale in the front of the oven. Nicety of adjustment must be made by means of the thermometer which is placed in the center of the chamber through the top.

The switches and controls are all operated from the exterior of the oven.

The inside chamber is painted with a durable light colored metallic paint.

The outside surfaces and base are painted with a high grade fume resisting paint.

Stamped sheet iron shelves are provided which may be set at desired heights on shelf racks.

For ovens requiring 1,000 watts or less, a connecting cord and Edison base plug are provided. For all others a connection must be made to feeders carrying the necessary wattage.

On the following pages the standard types are illustrated and their sizes are given.



FREAS CONSTANT TEMPERATURE ELECTRIC DRYING OVEN

Type R, No. 100

Chamber Dimensions:
12" x 12" x 12".

Temperature Range: Room to 175° C.

This is a most satisfactory oven for general drying work, such as in determining the moisture content of coals, sugars, etc., and for the baking of enamels or other work wherein a definite temperature must be maintained for indefinite periods.

The construction is the Freas construction already described.

It maintains a constant temperature, that is $\pm \frac{1}{2}$ °C. for any desired length of time.

Price complete, \$135.00.



FREAS CONSTANT TEMPERATURE ELECTRIC DRYING OVEN

Type R, No. 108

Inside chamber dimensions:

16" wide x 14" deep x 16" high.

Temperature range; Room to 175° C.

This oven is of the same type and construction as the Type R, No. 100, except that it is larger.

It is provided with a substantial cast iron detachable stand of convenient height.

Price with the stand, \$235.00.



FREAS CONSTANT TEMPERATURE ELECTRIC DRYING OVEN

Type R, No. 110

Inside chamber dimensions:

14" wide x 17" deep x 18" high.

Temperature range: Room to 175° C.

Where wall space is limited and a heavier wall with its better insulation is desired this oven will be found most satisfactory. Otherwise, the construction is the same as that embodied in the oven Nos. 100 and 108.

As with the No. 108 it is provided with a detachable iron stand.

Price complete, \$265.00.



FREAS CONSTANT TEMPERATURE ELECTRIC DRYING OVENS

Type R, Nos. 136 and 140

Inside chamber dimensions:

No. 136, 26" wide x 14" deep x 20" high.

No. 140, 32" wide x 18" deep x 22" high.

Temperature range: Room to 175° C.

With such a large capacity these ovens are most satisfactory where a great deal of similar work is to be carried on at once.

Generally, we would recommend the use of several smaller units because of the flexibility gained.

The construction is the same as that used in the other types already described.

Price complete,

No. 136, \$330.00; No. 140, \$400.00.



FREAS ELECTRIC OVENS

Type C, Nos. 102 and 112

Inside chamber dimensions:

No. 102, 12" w. x 12" d. x 12" h.

No. 112, 16" w. x 14" d. x 16" h.

Equipping this oven with a removable glass door and a low wattage heating plate in addition to the regular heating plate, permits its use as an incubator as well as a regular drying oven.

Using the low wattage heating plate gives a temperature range from that of the room to 70° C.

The regular heating plate provides a temperature range from that of the room to 175° C.

No. 112 is similar in appearance to No. 108, having the additional equipment mentioned above.

Price complete:

No. 102	\$160.00
No. 112	\$265.00

FREAS



FREAS CONSTANT TEMPERATURE ELECTRIC VACUUM OVENS

Types RV and LV

Inside vacuum chamber dimensions:

RV, 9" diameter by 9" deep.

LV, 9" diameter by 18" deep.

Temperature range: Room to 175° C.

These pieces of apparatus consist of one of the regular ovens of appropriate size, inside of which is placed a cast bronze cylinder, in which substances may be dried under vacuum at a constant temperature.

Use of a vacuum not only materially reduces the time of drying, but it prevents the burning of the sample.

If desired the vacuum chamber may be easily removed and the oven may be operated as a regular drying oven.

By means of a small attachment, the chamber may be filled with some other gas, viz.: hydrogen, nitrogen, etc., at pressure less than atmosphere.

Price:

RV complete,	\$265.00
Vacuum cylinder only	130.00
LV complete	375.00
Vacuum cylinder only	205.00



FREAS HIGH TEMPERATURE ELECTRIC OVEN

Type HT, No. 104

Inside chamber dimensions:

No. 104, 12" w. x 12" d. x 12" h.

No. 114, 14" w. x 17" d. x 18" h.

By using a higher resistance in the heating plate, these ovens will attain a temperature of 260° C.

Being equipped to operate at such temperatures they will be found quite satisfactory to use in baking tests, for the determination of the flash point of non-volatile oils, in fact wherever, the range of the regular No. 100 oven will be found inadequate.

Otherwise the construction is essentially the same as that of the regular No. 100 oven.

Price complete:

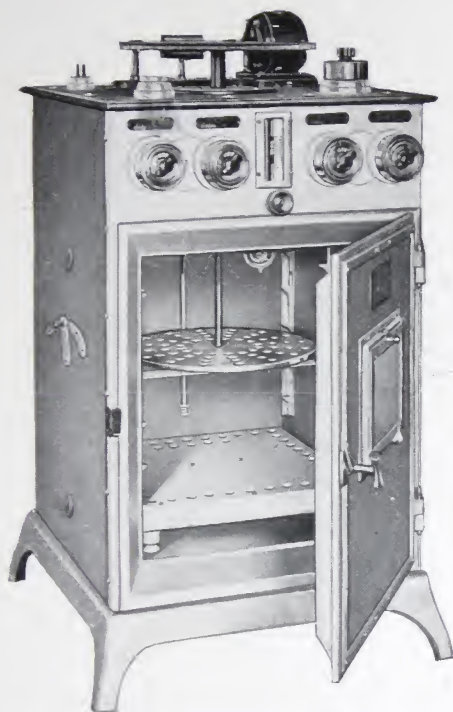
No. 104

\$165.00

No. 114 with detachable stand

285.00

FREAS



FREAS REVOLVING SHELF ELECTRIC CONSTANT TEMPERATURE OVEN

Type RS

Inside chamber dimensions :

12" w. x 12" d. x 12" h. Dia. of Shelf, 10".

This type consists of a regular No. 100 oven equipped with a perforated, cast aluminum, revolving shelf, operated by a small electric motor.

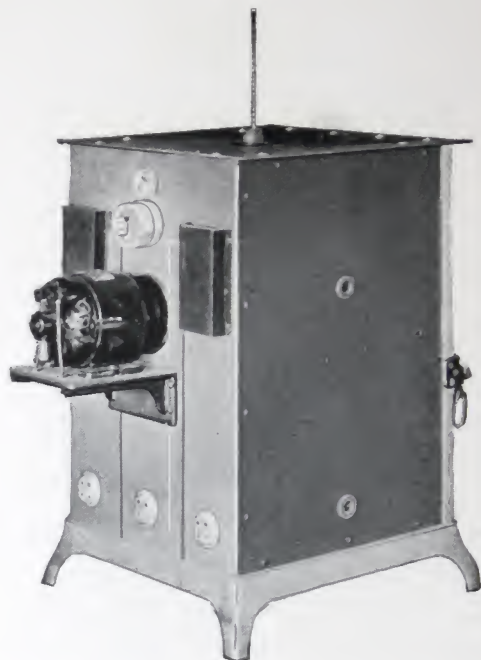
By this arrangement, as suggested by the late Mr. Roy C. Fitch of the U. S. Bureau of Standards, each sample is subjected to the same average uniform temperature.

By arranging the revolving shelf with a tilting device, the liquid samples are kept in constant agitation, thereby hastening evaporation.

Supplied with connecting cord and plug.

Price

\$240.00



FREAS ELECTRIC CONSTANT TEMPERATURE FORCED AIR OVEN

Type FA, No. 101

Inside chamber dimensions:

- | | |
|---------|--------------------------|
| No. 101 | 12" w. x 12" d. x 12" h. |
| 105 | 12" w. x 12" d. x 12" h. |
| 109 | 16" w. x 14" d. x 16" h. |

A small centrifugal fan in an exhaust flue provides for the rapid removal of the moisture laden air from the drying substance. Thereby the time of drying is materially reduced.

This type is particularly desirable where large quantities of moisture must be removed from the samples under test.

Nos. 105 and 109 are provided with high wattage heating plates and therefore are not provided with a connecting cord and plug as No. 101 is.

Prices:

No. 101	\$225.00
105	245.00
109	330.00

FREAS



FREAS ELECTRIC CONDITIONING OVEN

No. 200

Inside chamber dimensions:

12" w. x 12" d. x 12" h.

Supplied with ten baskets, each 2 $\frac{5}{8}$ " by 1 $\frac{5}{8}$ ".

The importance of rapid and accurate moisture tests to the manufacturer of textiles and paper, is daily receiving wider recognition.

The Freas Conditioning Oven enables the most accurate tests to be made at constant temperatures, without exposure of the samples to the outside air, thereby eliminating materially the chances of error.

The oven itself is the same as the regular No. 100 oven.

The Special Conditioning Equipment consists of observation windows in the door and in one side of the oven, standard low speed motor providing forced circulation of the heated air which rapidly removes the moisture, special chain movement controlled from the outside and permitting the baskets to be moved, changed, or weighed at will without opening the Oven.

The conditioning oven can be fitted with a torsion balance, as shown in the illustration, or with an analytical balance if desired.

Supplied with connecting cord and plug.

Price, with 110 volt motor, without balance

\$305.00



FREAS ELECTRIC INCUBATOR

No. 26

Inside chamber dimensions:

12" w. x 12" d. x 12" h.

Temperature range: Room to 70° C.

This Incubator is constructed on the same general principle and of the same materials as Freas Oven Type R, No. 100.

In addition an interior glass door is fitted, permitting observation of the contents without exposure to the outside air with consequent chilling.

Also a low temperature heating plate is supplied instead of the regular 600-watt heating plate in the oven.

Supplied with a connecting cord and plug.

Price

\$140.00



FREAS ELECTRIC INCUBATOR

Nos. 28 and 32

Inside chamber dimensions:

No. 28 16" w. x 14" d. x 16" h.

32 18" w. x 16" d. x 18" h.

Temperature range: Room to 70° C.

The construction and equipment is similar to the No. 26 already described, except that these are of larger size.

Supplied with connecting cord and plug.

Prices:

No. 28

\$235.00

32

260.00

FREAS



FREAS ELECTRIC INCUBATOR

Nos. 36 and 40

Inside chamber dimensions:

No. 36 26" w. x 14" d. x 20" h.

40 32" w. x 18" d. x 22" h.

Temperature range: Room to 70° C.

Differing only in size, these incubators are otherwise identical to No. 26 already described. They are particularly adaptable for use in hospitals or other large institutions where a large number of cultures must be made at the same time.

Either size can be supplied with or without the center column.

Supplied with connecting cord and plug.

Price:

No. 36

\$330.00

No. 40

390.00



FREAS ELECTRIC STERILIZERS

Nos. 66 and 67

Inside chamber dimensions :

No. 66 12" w. x 12" d. x 12" h.
 67 12" w. x 12" d. x 12" h.

The Freas Sterilizers are identical in construction and equipment to the Freas Ovens, Type R.

They are designed for use in hospitals or laboratories where sterilizing must be done under regulated conditions.

No. 67 differs from No. 66 in that it is supplied in addition with a removable inner glass door and a low wattage heating plate, thus permitting its use as an incubator as well as a sterilizer.

Supplied with a connecting cord and plug.

Price :

No. 66

\$135.00

No. 67

160.00



FREAS SENSITIVE WATER THERMOSTAT

Small

Dimensions of the glass tank:

15" diameter by 14" deep, Capacity, 10 gals.

This is practically the same in operating characteristics as the larger type already described.

The tank is of glass and is covered with horse-hair felt and felt insulation. A window is left in the covering for observation purposes.

Regulation is accomplished with a mercury control operating a sensitive thermal relay.

Heating is by means of two heater lamps.

Constancy is maintained within $.01^{\circ}$ C. indefinitely. Uniformity is produced through a turbine stirrer operated by a small electric motor.

Price with 110-volt motor, without mercury

\$220.00

FREAS



FREAS ELECTRIC WATER BATH

Inside dimensions of tank above shelf:

18" l. x 12" w. x 4" d.

A water bath will have a more uniform temperature throughout the medium than any air bath or oven, by its very nature.

This bath consists of a heavy copper tank tinned on the inside and insulated with a heavy asbestos covering on the outside.

Regulation is by means of the Freas Thermo-Regulator maintaining the temperature constant within about 1° C.

Heat is furnished by a heating plate of high resistance wire under the copper tank. It has a range of temperature from that of the room to about 65° C.

Price complete with cover as shown	\$180.00
Price without cover	150.00

FREAS



FREAS ELECTRIC TUBE FURNACE

Four Tubes, each:

1 $\frac{1}{8}$ " dia. by 25" long.

This is designed for the organic chemist who is making tests where explosions are likely to occur. Through the patent Freas Temperature control, untimely explosions are less likely to occur than with the old gas fired furnaces where the temperature will fluctuate considerably. The test is placed in the tubes which are sealed at one end. No one in the laboratory will be endangered if an explosion should take place, for the heavy hinged door will direct the fragments to the floor.

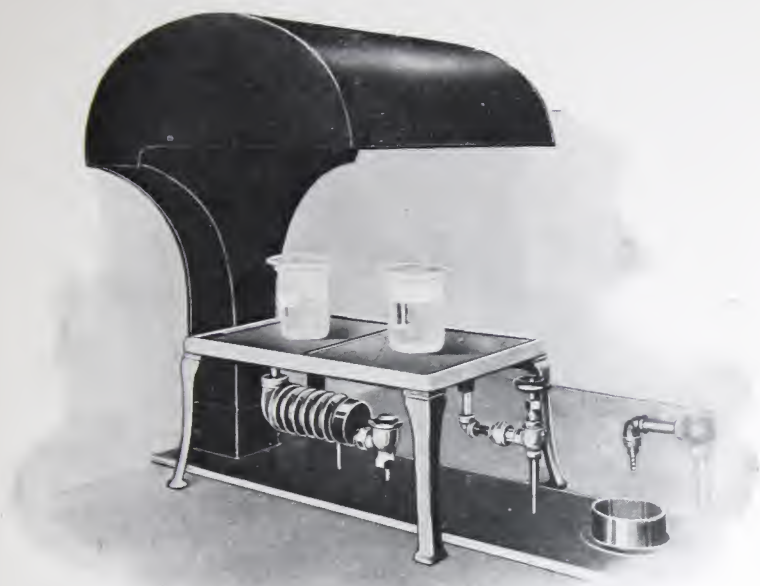
The temperature control is through the patent Freas Thermo-Regulator.

The range of temperature is from that of the room up to 260° C. Therefore this oven has a high wattage heating plate requiring direct connection to the line of electric supply.

Price complete with tubes

\$235.00

FREAS



FREAS STEAM HOT PLATE

Area of working surface: 20" x 13". Height: 9".

The Freas Steam Hot Plate has been developed to provide a means of warming substances in the laboratory, particularly under the hood.

It is made out of lead cast around a composition frame carrying a coil of copper tubing. One end of the copper coil is connected to the steam line and a trap is attached to the other end permitting the condensate to be returned to the system or discarded as desired.

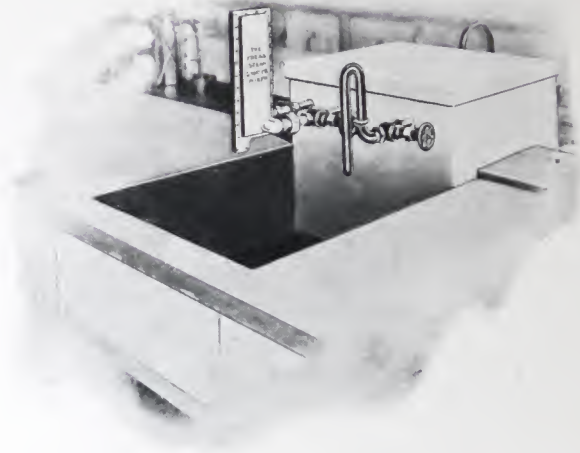
The use of lead as a body renders the apparatus impervious to the attack of the laboratory fumes or of acids spilled on the plate.

Through the use of copper tubing a proper relation of expansion coefficients is maintained and at the same time heat transmission is as efficiently carried out as possible.

For general laboratory use this plate will be found invaluable.

Price complete

\$80.00



FREAS STEAM-WATER MIXER

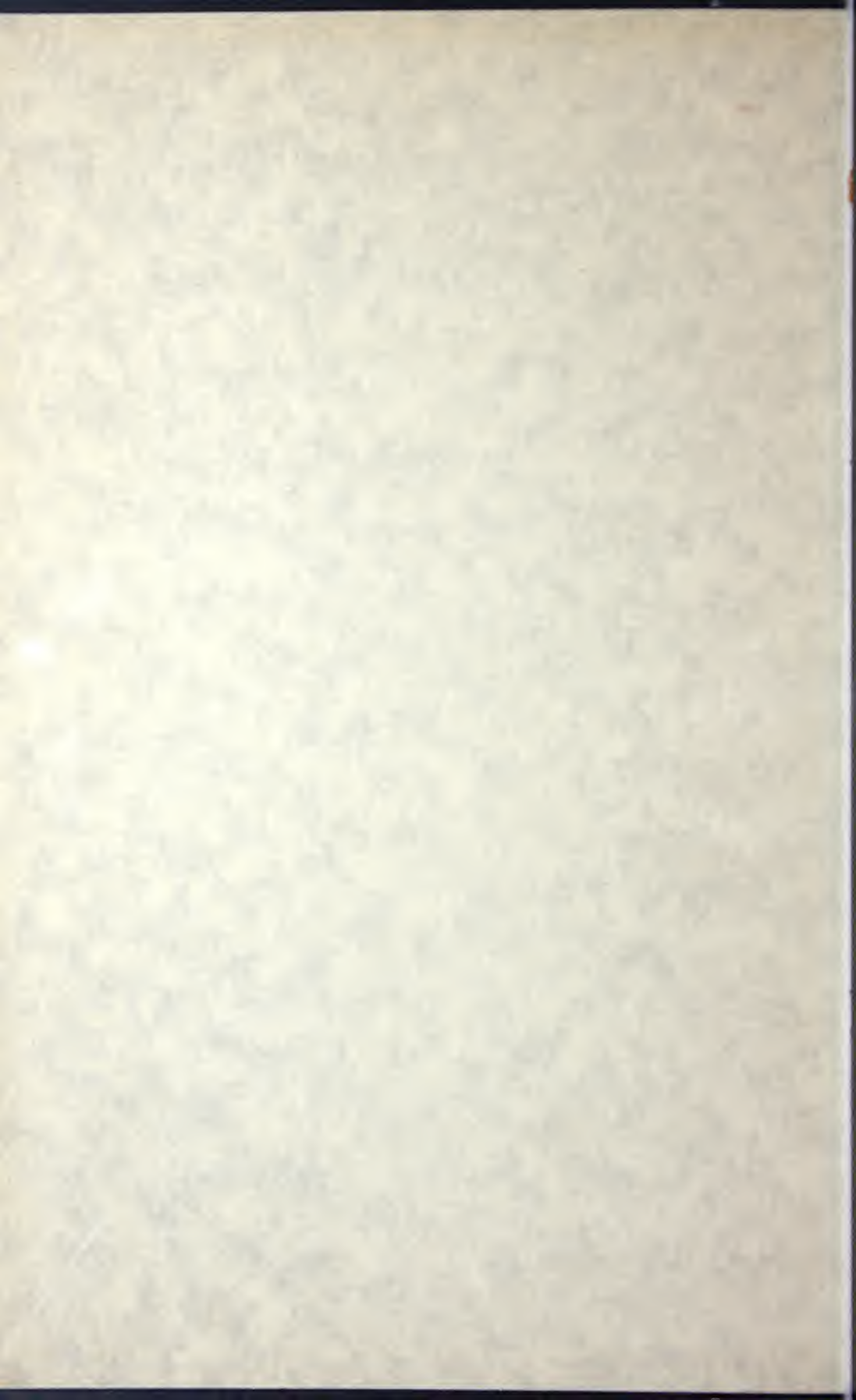
This is designed to provide a supply of hot water when steam is available together with a supply of running cold water.

The steam and water are so mixed as to get the greatest thermal efficiency out of the heat supplied and yet an even stream of hot water results, that is not accompanied by pounding of the pipes due to water hammer. Also, the temperature of the resulting mixture can be regulated so that the user will not be subject to danger from burning due to the emission of scalding hot water or live steam.

These mixers have been used quite satisfactorily in the laboratories of one of the largest schools in the country.

Price complete with two globe valves \$22.50





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